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A M E R I C A N

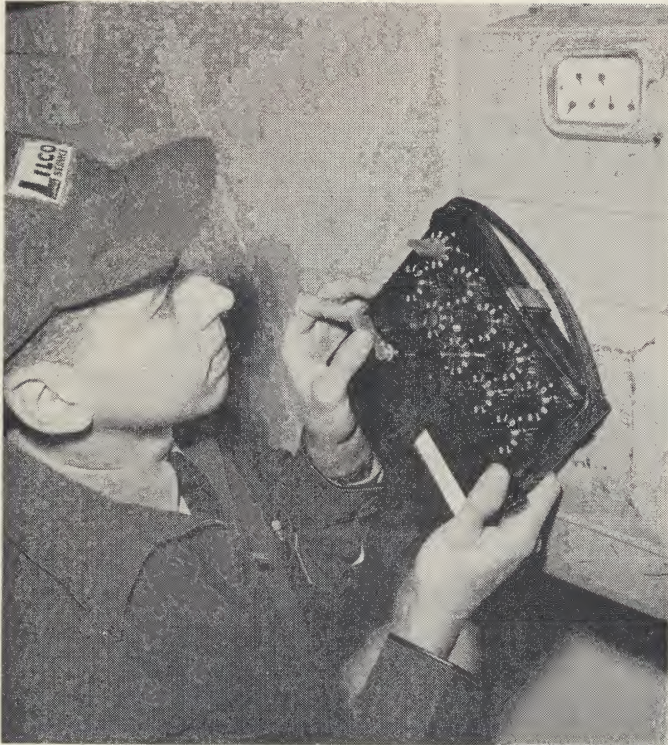
Gas Journal



LILCO AUTOMATES ITS METER READING



*Route Books replaced with tape,
magnetic digital recorder as . . .*



LILCO meterman in Far Rockaway district uses the Metercorder to record reading of typical gas meter on his route. Utility expects to have units in use on all 11 of its districts by this summer.

A PORTABLE, EASY-TO-USE RECORDING DEVICE called a "Metercorder" — now in the first weeks of use in portions of Long Island Lighting Co.'s service area — makes the standard gas utility paper route book look as old-fashioned and inefficient as Annie Rooney's apple cart with the wheels off!

In case you haven't heard about the Metercorder yet, it is technically described as a "magnetic digital recording instrument to automate the introduction of meter readings into the customer billing process." It was developed in the highly productive R&D laboratories of the UGC Instruments Div. of United Gas Corp.

Metercorders have been used in United Gas Corp.'s distribution system for more than a year, but LILCO is the first utility besides United to convert its meter-reading operations to the device . . . and the first, of course, to use it for both gas and electric meters.

After a lengthy period of testing the unit and training route personnel in its use, LILCO



EDP staffman changes tape on one of two tape units connected to LILCO 1401 system. Customer account data from master tape is fed to 1404 printer, left, which prints out route tapes.



UGC Instruments interpreter reads data from returned magnetic tapes after route is covered, translates this information into language of the 7074 computer and puts this data on 1/2-in. tape.

LILCO Automates Its Meter Reading

started using the units Jan. 2 in its Far Rockaway district. This district, in the Queens-Nassau portion of the utility's service area, has about 150,000 of LILCO's more than 1,000,000 meters — 350,000 gas and 650,000 electric.

Using the Far Rockaway conversion as a pattern, the company plans to adopt the Metercorder program in its other 10 districts on a 1 or 2-a-month basis. Target date for complete conversion of the system to Metercorder operation is set for late this summer.

Even with such a short time of experience with the Metercorder on a limited scale, LILCO officials are enthusiastic about the instrument, its operation and effect upon the company. Here are some of the more important advantages they see already over the former meter-reading system:

- **LOWER COSTS AND IMPROVED EFFICIENCY.** Tape-to-tape conversion of meter data from Metercorder tape to high-speed computer tape substantially eliminates key

punching and other intermediate processing steps in the meter reading system. Says Frank C. Mackay, manager of LILCO's customer relations department: "This is the major advantage that attracted us to the Metercorder. Under our former system, the processing of 30,000 meter readings onto punched cards to feed into LILCO's data processing equipment was an all-day job. Using the Metercorder, this meter data can be ready to be fed into our 7074 computer system in just half an hour.

"Also, the cost of the meter recording devices, plus the cost of the interpreter equipment that converts Metercorder tape to computer tape, will be recovered within a year by the savings resulting from the sizable reductions in the key-punching operation."

- **IMPROVED ACCURACY.** Gone are such traditional causes of error as meter readers' mistakes in subtraction and the misreading of poorly written figures.

Through specific programming of the computer system, each meter-reader's performance



LILCO EDP staffers work console of utility's huge 7074 computer system. System has 12 IBM 729 tape units attached. One reel of tape can contain 20,000 complete customer accounts.

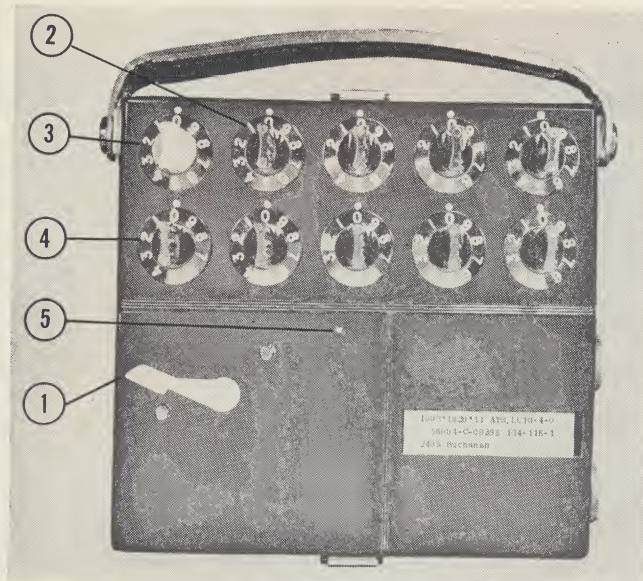
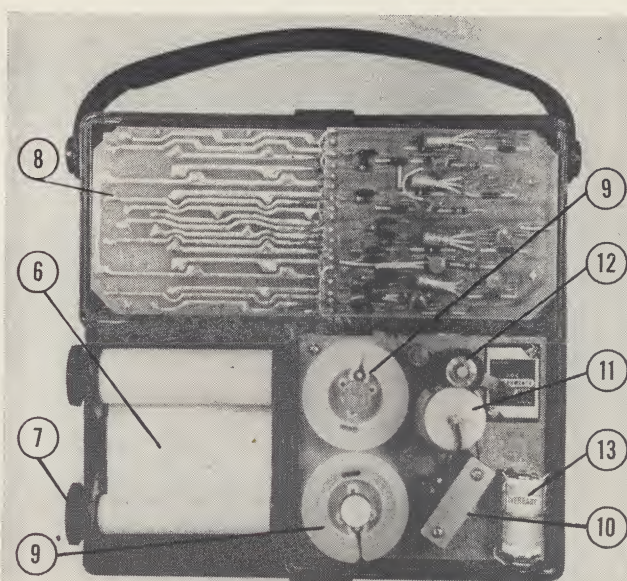


Fig. 1. Principal features of the Metercorder:

1. ADVANCE LEVER—advancement of lever causes commutator switch to sample the 10 switch dials;
2. SWITCHES—Upper Bank—top 5 switches enter customer account number or folio number on tape;
3. RED CODE SWITCH—applies various information codes to tape. (codes listed in Fig. 3);
4. SWITCHES—Lower Bank—lower 5 switches enter reading of customer's gas meter on the tape;
5. RECORD LIGHT—when lever is advanced light signals that battery power is sufficient;
6. ROUTE PAPER TAPE—In essence, the meter reader's route book, listing all route info;



7. ROUTE LIST SPOOLS—after reading, meterman manually advances paper tape by turning spools;
8. PRINTED CIRCUIT BOARD—contains transistor and storage matrix diode circuitry;
9. MAGNETIC TAPE REELS—Holds 60 ft of 1/4-in.; 1-mil mylar magnetic tape for recording readings;
10. RECORD-HEAD—records reading data onto magnetic tape in binary coded decimal (BCD) form;
11. CAPSTAN—shaft that causes tape to be advanced under pressure of pressure roller;
12. PRESSURE ROLLER—applies constant pressure against Capstan to aid in driving tape forward;
13. BATTERY—this 2.5-volt mercury battery furnishes all power needed for recording data.

is checked for accuracy, thus affording, in effect, a daily evaluation of every meter reader and his operation of the Metercorder.

Let's take a closer look at the Metercorder magnetic digital recorder and then see how and why Long Island Lighting is putting it to use.

Fig. 1 shows the Metercorder from the front, as it looks to the meterman using it, and from the back with the cover off to show its working parts. The main components and their uses are detailed by the various numbers and corresponding descriptions.

The instrument weighs a shade less than 3 lb, about the same as an average meter book, and has a minimum life expectancy of 5 years.

LILCO officials became interested in the Metercorder in 1962, while final plans were underway to convert the utility's accounting functions to data processing equipment. The company realized that tying its meter-reading

system of meter books and punched cards to the high-speed 7074 computer was like going to the moon in leather helmet and white scarf. It was obvious that a faster meter data input system was needed, and the Metercorder was considered an answer to the problem.

In August 1962, a LILCO investigative task force—made up of representatives from customer relations, the methods department and office of the controller—visited the Shreveport facilities of UGCI to look over the Metercorders. The group returned with a sample instrument.

During the next few months, the group used the test unit to study its application on various meters, locations and conditions in the utility system. Also studied were program and equipment requirements to adapt the Metercorder to the new LILCO computer system. Sample tapes were sent back to UGCI for processing and evaluation.

They tested the unit for security against

Fig. 2. This is sample portion of paper route tape that is printed at LILCO's data processing center by an IBM 1404 printer. Route tape is rolled onto spindle and sent to district office for use next day.

DISTRICT OFFICE 1		
09-001-14	ROUTE 0	
ROCKAWAY POINT	NY	
JAN 14		
INSERT HEADER LABEL		
CONTROL	09999	
	00000	
VACANT	1	
50 QUEENS WALK	1810	
18- 568270	- 4796	
ML15		
13- 314911	- 029	
ML15		
VACANT	1	
48 QUEENS WALK	1820	
18- 362106	- 8641	
ML57		
13- 641760	- 0599	
ML57		
MR LEONARD AHERN	1	
46 QUEENS WALK	1830	
18- 560567 NEW	- 5052	
ML15		
13- 620625 NEW	- 367	
ML15		
VACANT	1	
44 QUEENS WALK	1840	
18- 146571	- 8508	
ML15		
13- 664900	- 0474	
ML15		
VACANT	1	
42 QUEENS WALK	1850	
18- 361538	- 3894	
ML15		
13- 63482	- 342	
ML15		
MR HENRY SCHABERICK	0	
40 QUEENS WALK	1860	
18- 577461 NEW	- 7822	
ML57		
13- 642361 NEW	- 0803	
ML57		
EDWARD P MC ANIFF	0	
38 QUEENS WALK	1370	
18- 580239 NEW	- 9290	
ML15		
13- 85910 NEW	- 119	
ML15		

USE OF CODE NUMBERS		METER LOCATION CODES	
* Means advance lever		Outside Information	01 - 09
0. GAS - Top "0" & folio - Bottom index *		Inside Information	10 - 19
1. ELE - Top "1" & folio - Bottom index *		Meter Room Outside	20 - 29
2. DEM METER - Top "1" & folio		Meter Room Inside	30 - 39
Bottom KWH index *		Outside Misc. Locations	40 - 49
Top "2" leave folio - Reset Demand		Inside Misc. Locations	50 - 59
Bottom Demand index *		Apartment Floor	60 - 69
3. DO NOT EST - Top "0" or "1" & folio		Open	70 - 79
Bottom 5 zeros *		Open	80 - 89
Top "3" leave folio and 5 zeros *		Open	90 - 98
4. VERIFY INDEX - Top "0", "1" or "2" & folio		Special Instructions	99
Bottom index *			
Top "4" leave folio and bottom index *			
5. METER CHANGE - Top "0" or "1" & folio		READING INSTRUCTION CODE	
Bottom index *		Dog Information	01 - 09
Top "5" leave folio and bottom index *		Door Information	10 - 19
For change demand - Top "7" and folio		Knocking Information	20 - 29
Bottom demand index BEFORE reset *		Key Information	30 - 39
Top "2" leave folio. Bottom demand		Dial Card Instructions	40 - 49
index AFTER reset *		Reading Information	50 - 59
6. DIAL CARD - Top "0" or "1" & folio		Customers request information	60 - 69
Bottom index *		Open	70 - 79
Top "6" leave folio and bottom index *		Open	80 - 89
7. DEMAND RESET - Top "1" & folio		Open	90 - 98
Bottom KWH index *		See Special Instruction	99
Top "7" leave folio. Bottom demand			
index BEFORE reset *		HEADER AND TRAILER	
Top "2" leave folio. Bottom demand		* Means advance lever	
index AFTER reset *		1. Top all zeros	00000
8. ESTIMATE - Top "0" or "1" and folio *		Bottom all zeros * 10 times	00000
Bottom 5 zeros		2. Header label	
Top "8" leave folio - Bottom 5 zeros *		Top cycle number	00000
9. ERASE TO CORRECT - Top "9" & folio		Bottom Dist. & Rt. number *	00000
Bottom repeat folio with extreme left		Top	00000
dial at "0" *		Bottom mo., day, both digits of yr. *	00000
To enter correction use applicable steps.		Top Meter Reader number	00000
		Bottom Metercorder number *	00000
		3. Trailer label	
		After last rdg of Bk or Frt.	
		Top all zeros	00000
		Bottom all zeros * 10 times	00000

Fig. 3. These two slips are pasted on back of LILCO Metercorders to remind metermen of the various codes. Left slip is for use of red code dial; right slip details route tape codes.

the elements. The Metercorder was left out in the rain, put in a zero-degree freezer, placed outside in the sun on a blistery 90-F day ... and dropped, thrown and kicked to test its high-impact plastic case. It proved weather-proof and ruggedly dependable each time. UGCI certifies the Metercorder as operable between -25 and 125 F and under all but the worst handling.

After working with it for several months, the task force could suggest only one minor adaption in the device as a safeguard against battery failure. UGCI tests showed the Metercorder's tiny 2.5-v mercury battery could run up a total of more than 1,000,000 recordings before failing. At normal use, this would give each battery nearly a half-year of life.

LILCO was still wary, however, according to John Faller, district office division manager: "We saw that 70¢ battery as the one weak point," he recalls. "There was no way for the man using the unit to tell if the battery was

providing power or not. If the battery, unknown to the meterman, went out on the route, he would continue reading meters unaware that the data he was putting into the device was not being recorded. In this way, a whole day's readings could be lost because of an inexpensive, easy-to-replace battery".

The task force solved this problem two ways: they recommended all batteries to be replaced with new ones as a regular once-a-month routine; and they asked UGCI to install a tiny visible battery tester on the case front. Hardly larger than the period at the end of this sentence, the speck-sized bulb lights up to signal the battery is still usable when the advance lever is pushed slowly through the test position.

With all questions answered to satisfaction, LILCO ordered 130 Metercorders in March 1963. This total allows several spare instruments to be kept at each district office, as LILCO has some 105-110 meter readers working routes each day.

The first 30 units, delivered in August, were used by division manager John Faller to develop a comprehensive personnel training program. Starting in December, Faller conducted a series of five 3-hr evening sessions on company time — first for the 11 district office supervisors, then again for the 15 metermen at Far Rockaway district.

The training started with a thorough introduction to and familiarization with the Metercorder. Each trainee had an instrument of his own to operate during the lectures, so he could see first-hand each component as the device was explained.

The trainees then were shown a series of 370 color slides over the next two meetings, each slide depicting a field picture of a LILCO meter. They used their sets to record the meter readings as they flashed on the screen. Tapes from the training sessions were actually run through LILCO's newly installed 7074 computer system for evaluation of each man's performance with the Metercorder. Each mistake was detected by the computer and could then be brought to the attention of the trainee, explained and corrected.

"During the training," Faller says, "we stressed accuracy. We told the men, 'We know this is new equipment and you'll make mistakes the first few days. Don't worry about it — just correct your mistakes.'

"In the last slide test, we really threw everything at them ... wrong meters to be read, broken glass on a meter to see if they remembered to order a replacement, high and low readings. Most of the men caught the ringers right away."

This training period and stress on accuracy has paid off. A week before the official switch-over to the new system after New Year's, one of the trainee-metermen in Far Rockaway district was picked at random to parallel a route already done as a final dry-run test. The man made just one mistake — and that was while trying to correct an error he knew he had made.

A check of all the district metermen was made after the first few billing cycles. In the first 6800 meter readings using the Metercorder, the men made 23 errors — less than ordinarily would be made using meter books. And of these, 10 were made by the same meterman, who failed to "click" a dial completely into place.

Briefly, here is a step-by-step look at LILCO's procedure using the Metercorder:

1. The day before a specific meter route is to be read, a "route tape" (see Fig. 2) is printed on paper at the data processing center by a 1404 printer — at 600 lines/min. — then sent to the district office. This paper tape contains the very latest data on customer accounts con-

tained in that route, as it is up-dated daily.

2. In the morning, the meterman inserts the route paper tape in his Metercorder, along with a 60-ft reel of 1/4-in. magnetic tape capable of holding 1400 readings. By positioning the Metercorder's dials, he then puts a "header label" on the magnetic tape. This consists of route number, billing-cycle number, district, his meter-reader's number, Metercorder number and date, plus a code signal to the 7074 computer that the first account is coming up.

3. On the route, the meterman follows the paper route tape listing from meter to meter. If he puts the meter readings on out of sequence ... nothing will happen. When the meter reading tapes are transferred to billing tapes, they are rearranged in account order sequence before processing for billing.

4. After the route is finished, the meterman puts a "trailer label" on the Metercorder magnetic tape, which tells the computer in code that the route information has ended. He unloads both tapes, magnetic and paper, from the unit. All magnetic tapes from the district office for that day are then spliced together on a 5-in. reel and sent to the data processing center.

5. These reels are processed by a UGCI on-line interpreter which reads the data from the 1/4-in. Metercorder tapes and transfers it onto standard 1/2-in. tape in the program language "understandable" to the 7074 computer. The interpreter can process a full day's meter readings from all 11 LILCO districts in 30 min. The tapes then are fed into the mammoth 7074 which calculates the customer billing.

What problems has LILCO found in the few weeks since it started using the Metercorder?

Comments customer relations manager Frank Mackay: "The men had the perfectly human reaction to something new. They were a little fearful. They looked at all the knobs and tapes and lists of things to remember and wondered if they would ever be able to get it right.

"This passed after the first few hours of training. We could see their enthusiasm build during the training periods as they became more proficient. They soon realized, and we were quick to assure them, that the Metercorder, rather than replacing men, would help them become more efficient and more accurate meter readers than ever before."

That's how Long Island Lighting is using the Metercorder for its meter reading. If its success at LILCO is any indication of its potential impact on the gas distribution industry, it's an odds-on bet that paper route books will soon join leather diaphragms and fuel oil heaters in the "Never-More."

AGJ

the metercorder



The **METERCORDER**, the first portable digital magnetic tape recorder, was developed by UGC Instruments specifically for utility meter-reading. During extensive tests, however, the **METERCORDER** proved its adaptability for all data-gathering needs. In the field, in industry — wherever there is a need for gathering digital information — The **METERCORDER** gets it anytime, anywhere, in any weather, fast and accurately on magnetic tape.

The **METERCORDER** is the first portable digital magnetic tape recorder. It is the recording device in a complete system for data-gathering and processing. In extensive field and laboratory tests by United Gas Corporation, the **METERCORDER** has been subjected to every climatic and operational abuse. In utility meter-reading it licks the problems of losing, jamming and smearing of cards or route books.

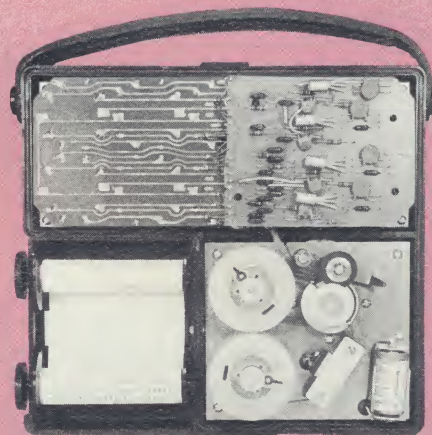
The **METERCORDER** is compact, sturdy and weighs 2¾ pounds. It is transistorized, containing no tubes or oscillator circuits, and is powered by a 2½-volt battery that will last from one to two million readings. Numbers set into the dials by the operator are recorded on quarter-inch magnetic tape by a single lever stroke. In extreme cold, the Metercorder is easily and reliably operated, even when gloves are worn.

The **METERCORDER INTERPRETER** translates the recorded information to the language of the computer used: directly to the computer, to magnetic tape, to punched paper tape, to punched cards. The input speed of the Interpreter is that of the computer used—up to 100,000 recorded entries per hour.

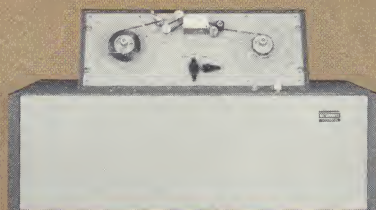
The **METERCORDER** data-gathering system will save thousands of dollars a year in tabulating and processing written forms, records and charts, and in mailing and shipping charges of these bulky records to accounting, billing and recording centers. For point-of-sale merchandising, inventories and stock control; in transportation, manufacturing and utility meter-reading — for on-the-spot data-gathering and processing anywhere, at anytime, in any kind of weather — the **METERCORDER** offers you a fully tested and proved digital data-gathering and processing system.



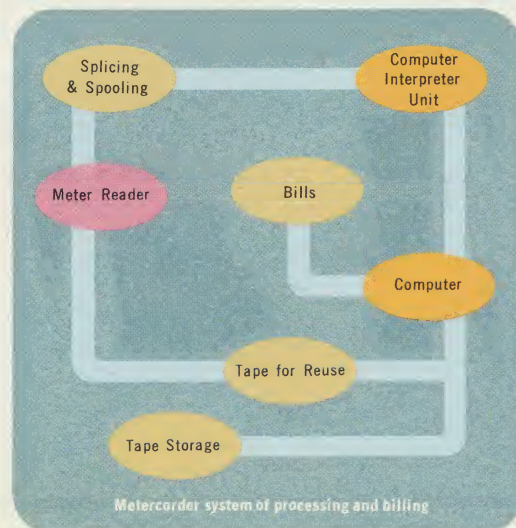
Cut-away front view of Metercorder



Cut-away back view of Metercorder



Transistorized Interpreter converts Metercorder tapes to language of your computer



Metercorder system of processing and billing

UGC

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